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NOTIFICATION CONCERNING
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To:

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International publication date *(day/month/year)*	Priority date *(day/month/year)* 29 September 2003 (29.09.2003)
Applicant RUTHERFORD, Stephen, Graham et al	

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Priority date	Priority application No.	Country or regional Office or PCT receiving Office	Date of receipt of priority document
29 September 2003 (29.09.2003)	0322740.2	GB	11 November 2004 (11.11.2004)
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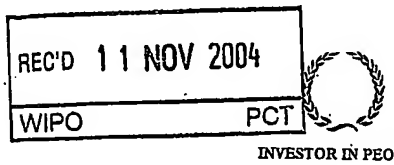

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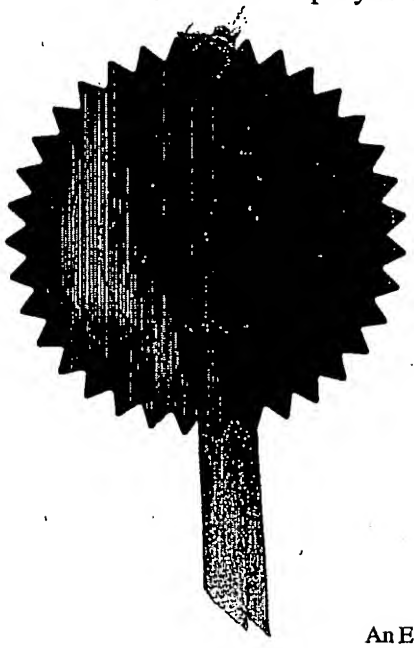

Signed Stephen Hurdle

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The Patent Office
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1. Your reference — PA 4920

2. Patent application number *(The Patent Office will fill in this part)* — 0322740.2 — 29 SEP 2003

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

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Patents ADP number *(if you know it)* 12977/2002

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Patents ADP number *(if you know it)* 8722377001

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention — IMPROVED PLATTER

5. Name of your agent *(if you have one)* — SOMMERVILLE & RUSHTON

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Patents ADP number *(if you know it)* 1511001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

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Number of earlier application	Date of filing *(day / month / year)*

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a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
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Patents Form 1/77

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Description	12
Claim(s)	4
Abstract	1
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Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	0
Request for preliminary examination and search *(Patents Form 9/77)*	0
Request for substantive examination *(Patents Form 10/77)*	0
Any other documents *(please specify)*	0

11. I/We request the grant of a patent on the basis of this application.

Signature: Sommerville & Rushton — Date: 29 September 2003

12. Name and daytime telephone number of person to contact in the United Kingdom: DR JAMES PITCHFORD 01727 854215

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IMPROVED PLATTER

This invention relates to a platter for use in commercial ovens.

Background to the Invention

Forced air / microwave combination ovens are in common usage, and one popular model is the TurboChef C3 oven, supplied by TurboChef Technologies, Inc., of 10500 Metric Drive, Suite 128, Dallas, TX 75243, USA. Such ovens are typically found in petrol stations, motorway service area cafeterias and roadside restaurants, and are used for cooking or defrosting a wide range of foods such as pizzas, hot filled baguettes, lasagne, steak, fish, burgers and pies. The ovens use a combination of rapidly-moving electrically-heated hot air and microwave radiation, and will be referred to herein as forced air / microwave combination ovens. The TurboChef C3 can reach a cooking temperature of 275 °C, and cooks on average at seven times the speed of a conventional oven. The microwave generator is located beneath the oven chamber, and transmits microwave radiation via a waveguide up into the oven chamber. The forced air is delivered from above, into the top of the oven chamber, and is extracted from the bottom of the chamber, beneath the platter. The microwave and hot air modes of cooking food may be used independently or together, and the oven is processor-controlled to run a range of cooking routines using the different cooking modes.

The platter of a forced air / microwave combination oven is located towards the bottom of the cooking chamber, above the microwave generator. The platter is essentially a shelf on which cookware is placed, the cookware containing the food to be cooked. The platter contains holes through which forced air passes, and is also microwave-permeable to enable

microwave radiation to reach food placed on the platter. Traditionally, such platters are made from a porous ceramic material, and several disadvantages, shortcomings and problems have been identified, as follows:

1. *Desire for greater cooking efficiency using forced air*

There is a desire to improve the efficiency of cooking using forced air, and also to reduce the frequency with which high temperature thermal cutout devices trip during service. This in turn would give rise to faster cooking times and more efficient use of energy. The current forced air cooking performance of such ovens, and the frequency with which the cutout devices trip, is thought to be influenced by the number and distribution of the apertures through the platter. Traditional ceramic platters have a somewhat irregular distribution of apertures, and there are areas in which relatively few apertures are provided. This is thought to limit the airflow and may give rise to undesirable thermal cutout trips in service. The limited number and irregular distribution of the apertures in traditional platters is thought to be because the ceramic material would be more liable to fracture if more apertures were provided.

Enhanced flow of hot air around and under the cookware on the platter is also desired, to improve the cooking performance yet further.

2. *Risk of incomplete cooking by microwaves alone*

Although the apertures are distributed across much of the area of a conventional ceramic platter, the microwave radiation used in the oven is concentrated in a specific area in the centre of the platter. Traditionally, the user has been free to position the food product anywhere on the platter. However, it will be appreciated that if the food product is to be

cooked only by microwave radiation, and not by hot air, then placement of the food off-centre on the platter can result in it not being adequately cooked.

3. *Handling and cleaning problems*

A forced air / microwave combination oven may be in almost continuous use throughout the day, particularly in motorway service areas and the like which are frequented by customers at all hours. Given the nature of the food products that are prepared, the platter can readily become unclean, particularly from cheese and other molten materials that fall from the cookware and become burnt onto the platter. In a catering environment, food hygiene and cleanliness are of paramount importance, and so the staff that operate the ovens are required to clean them regularly.

Traditionally, platters used in such ovens are made from a porous ceramic material, and chip easily when being cleaned, due to the inherent brittleness of the ceramic material. Cleaning staff may not be particularly careful when carrying out their job, and this increases the likelihood of chipping or breakage of the ceramic platters. Also, because of their porosity, conventional platters cannot be soaked during cleaning, as this would result in the platter taking in water through the network of pores inherent in the material. Thus, it will be appreciated that cleaning off the burnt on food products can be very difficult and time consuming to do properly, without soaking the platter. An unconscientious worker may well soak the platter, contrary to instructions, or may simply not clean the platter thoroughly.

Summary of the Invention

According to a first aspect of the invention there is provided a platter for use in a forced air / microwave combination oven, the platter comprising an upper surface and a lower surface

and incorporating a plurality of apertures passing through the thickness of the platter; wherein one or both of the surfaces of the platter incorporate a recess substantially surrounding at least one of the apertures.

The provision of recesses around the apertures advantageously promotes the flow of air under cookware placed on the platter.

In a first embodiment, the upper surface is profiled such that each aperture is substantially surrounded by an individual recess.

Preferably the recess tapers outwards towards the upper surface. This reduces contact between the cookware and the platter, which can facilitate removal of the cookware if the platter is dirty.

Particularly preferably adjacent tapering recesses meet at common points on the upper surface of the platter, thereby minimising contact between the cookware and the platter, and further facilitating removal of the cookware if the platter is dirty.

In a second embodiment, the apertures are arranged in an array of rows and columns, and the upper surface is profiled such that a plurality of apertures in a row are together surrounded by an elongate recess extending along said row. The elongate recess may taper outwards towards the upper surface. Such elongate recesses advantageously retain baguettes and long rolls placed directly on the platter, and also provide long unobstructed channels for airflow under the cookware.

Preferably the lower surface is profiled such that a plurality of apertures in a column are together substantially surrounded by an elongate recess extending along said column. The elongate recess may taper outwards towards the lower surface. This arrangement advantageously provides strength and flexural rigidity to the platter, and prevents undesirable flexing in use.

Either embodiment may optionally further incorporate an indentation shaped to receive an item of cookware, the indentation being positioned to align the cookware with microwave radiation in the oven in use. This advantageously ensures that food in cookware placed in the indentation is optimally exposed to microwave radiation, which is particularly important if only microwaving (and not hot air) is being used in a given cooking program.

The term "indentation" as used in this context should be interpreted broadly, to encompass any change in surface profile adapted to receive an item of cookware. Thus, an annulus or other protrusions that rise from the surface of the platter and which are adapted to receive an item of cookware, function in essentially the same way as an indentation and should be treated as such.

With either embodiment, the apertures may be distributed over substantially the entire surface area of the platter. This promotes airflow around the oven and provides a more extensive cooking area, and is also less likely to impede the flow of hot air which can often be the cause of the oven cutting out or tripping.

Preferably the platter is made of a polymer material, particularly preferably a liquid crystal polymer resin reinforced with glass, such as DuPont (RTM) Zenite (RTM) 7130.

Advantageously, such materials are easy to clean and may be soaked in water without detriment.

According to a second aspect of the invention there is provided a platter for use in a forced air / microwave combination oven, wherein the platter incorporates an indentation shaped to receive an item of cookware, the indentation being positioned to align the cookware with microwave radiation in the oven in use.

According to a third aspect of the invention there is provided a platter for use in a forced air / microwave combination oven, the platter incorporating apertures distributed over substantially the entire surface area of the platter.

According to a fourth aspect of the invention there is provided a platter for use in a forced air / microwave combination oven, the platter being made of a polymer material. Preferably the polymer material is a liquid crystal polymer resin reinforced with glass. Particularly preferably the platter is made of DuPont (RTM) Zenite (RTM) 7130.

According to a fifth aspect of the invention there is provided a forced air / microwave combination oven having a platter in accordance with any of the first, second, third or fourth aspects of the invention.

According to a sixth aspect of the invention there is provided a method of cooking using a forced air / microwave combination oven having a platter in accordance with any of the first, second, third or fourth aspects of the invention.

Brief Description of the Drawings

Embodiments of the invention will now be described, by way of example, and with reference to the drawings in which:

Figure 1 illustrates a forced air / microwave combination oven, indicating the position of the microwave waveguide and platter in use, and showing a prior art platter;

Figure 2 illustrates a first embodiment of an improved platter;

Figure 3 shows a close-up view of part of a platter in accordance with the first embodiment;

Figure 4 shows a variant of the first embodiment;

Figure 5 illustrates plan and side elevations of a second embodiment of an improved platter, without a central indentation; and

Figure 6 illustrates plan and side elevations of the second embodiment, with a central indentation to receive an item of cookware in use, and example dimensions.

Detailed Description of Preferred Embodiments

The present embodiments represent the best ways known to the applicant of putting the invention into practice. However they are not the only ways in which this can be achieved.

By way of background, Figure 1 shows an example of a TurboChef C3 forced air / microwave combination oven 10. The oven measures approximately 550 mm high, 740 mm wide, and 820 mm from front to back. The microwave waveguide 14 is situated at the base of the cooking chamber, and is covered by a waveguide cap 16. The platter 12 is then located on a pair of support rails 18, above the waveguide cap.

Traditional platters are made from porous ceramic material, and consequently cannot readily be formed into intricate shapes. As Figure 1 shows, a traditional platter 12 is essentially a

flat plate having a number of protrusions rising from the upper surface to support an article of cookware placed thereon. The protrusions are elongated with flat tops, and radiate from the centre of the platter. Some apertures are provided between the protrusions in the central region of the platter.

The embodiments of the invention that will now be described are presently preferably made from DuPont (RTM) Zenite (RTM) 7130, a liquid crystal polymer resin reinforced with 30% glass that is able to withstand temperatures of up to 289 °C, which is well in excess of the maximum operating temperature of the TurboChef C3 oven. This material is well suited to injection moulding, thereby enabling the intricate shapes of platters described herein to be readily formed. Highly advantageously, and in marked contrast to traditional porous ceramic platters, a resin platter can easily be cleaned without risk of brittle failure or chipping, and can be soaked in water without detriment. This enables better hygiene and levels of cleanliness to be maintained.

Other materials suitable for use in a forced air / microwave combination oven may be used instead of DuPont (RTM) Zenite (RTM), and the present disclosure is intended to apply to and encompass all suitable materials already in existence and those which have yet to be discovered or developed, such as advanced engineering polymers, glasses, ceramics and composite materials. For example, DuPont (RTM) Thermx (RTM), a high performance polyester, may be used as an alternative to Zenite (RTM).

Turning now to a first embodiment of the invention, Figure 2 shows a platter 20 incorporating an extensive array of holes or apertures 21, 22 passing through the thickness of the platter. The provision of an array of apertures as shown in Figure 2 is to be contrasted with the

limited number of apertures provided in a traditional ceramic platter. It is believed that an extensive array of apertures as shown in Figure 2 would not be favoured with a traditional ceramic platter, since such an array would be likely to promote fracture of the ceramic platter, with the array of holes behaving effectively as perforations and defining lines along which the platter would readily break. With the use of an engineering polymer, however, such an array may be readily formed and the platter is not prone to brittle fracture.

The apertures in the platter enable forced hot air to pass through during cooking. By providing a more extensive array of apertures than in traditional platters, the present embodiment of the invention provides a more extensive cooking area through which the hot air passes, and is also less likely to impede the flow of hot air, which can often be the cause of the oven cutting out or tripping.

The upper surface of the platter 20 is profiled such that the majority of apertures are each located within an individual recess 24. These recesses taper upwardly outwards, from the edge of each aperture, to join the upper surface of the platter. As shown in Figure 2, these tapers preferably meet at common points 26. Items of cookware are then supported on the pointed crests 26. This undulating surface profile provides a number of benefits and advantages to the performance of the oven. Firstly, by placing flat-bottomed cookware on the pointed crests 26, horizontal channels are formed between the underside of the cookware and the upper surface of the platter. Hot air can pass along these channels during cooking, and an array of channels such as this provides better overall circulation of hot air around the cookware. Secondly, this arrangement minimises contact between the cookware and the platter, thereby facilitating the removal of the cookware if the platter is dirty (e.g. with gooey cheese).

Not all the apertures need be surrounded by recesses.

In the embodiment shown in Figure 2, an optional indentation 28 is formed in the centre of the upper surface of the platter. Within the indentation 28, its upper surface 29 is flat. This indentation is positioned such that an article of cookware placed therein is positioned in the optimum area in the oven chamber for microwave cooking, i.e. above the outlet of the waveguide. The indentation 28 may be circular, as shown in Figure 2, although other shapes such as squares and rectangles are also possible. Articles of cookware may advantageously be shaped to locate within the indentation 28. If the cooking program for a particular item of food only uses microwave cooking, then the user could be instructed to use such an article of cookware (e.g. by colour coding the cookware in correspondence with the cooking program) and to locate it in the indentation. This then ensures that the food is placed in the optimum position for microwave cooking, and the user does not place it over to one side on the platter where exposure to the microwave radiation would be less effective.

If the positioning of food is not critical, e.g. because both hot air and microwaves are being used, then an article of cookware larger than the indentation may be used, to span the indentation. Alternatively, the cookware may be placed on the platter aside from the indentation.

Figure 3 shows a close-up view of part of a platter 30 that is broadly the same as that shown in Figure 2. The horizontal member 32 is optional. This figure clearly shows the undulating upper surface of the platter and the recesses around the apertures.

Figure 4 shows a variant of the embodiment shown in Figures 2 and 3.

Figures 5 illustrates a second embodiment of a platter 50. Here, the apertures are arranged in an array of rows and columns. The apertures that form a row (e.g. 52, 54) are together surrounded by elongate recesses 56, 57 extending along the row on the upper surface of the platter. Such elongate recesses provide specific advantages. Firstly, they retain baguettes and long rolls that are placed directly on the platter, and prevent them from rolling around. Secondly, when cookware is placed on the platter, the elongate recesses form long unobstructed channels between the platter and the underside of the cookware, which promote the circulation of hot air within the oven.

The lower surface (underneath) of the platter is also profiled to incorporate elongate recesses surrounding a plurality of apertures, but these recesses 59 run at 90° to those on the upper surface. That is to say, whilst the recesses 56, 57 on the upper surface extend along rows of apertures, the recesses 59 on the lower surface extend along columns of apertures. This arrangement has been found to provide strength and flexural rigidity to the platter, and prevents undesirable flexing in use. It has also been found to prevent distortion of the platter during injection moulding, when being manufactured.

In this embodiment, the elongate recesses taper outwards towards the outer surfaces of the platter.

Figure 6 illustrates a variant of the platter of Figure 5. This platter 60 incorporates a central indentation 62 to receive an item of cookware to ensure it is placed in an optimum position for microwaving, as previously discussed with respect to Figure 1.

Test results

A platter as described herein was used in conjunction with an article of cookware as described in our co-pending patent application entitled "Improved Cookware", to cook frozen pizza in a TurboChef C3 oven. The conventional cooking time for frozen pizza with this oven is 2.5 minutes. Remarkably, using a platter as described herein, and without changing the cooking temperature, the cooking time was reduced to 1.5 minutes, saving 40% of the conventional cooking time. Thus, not only is the cooking process substantially expedited, but energy is also saved by virtue of the oven being operational for less time.

CLAIMS

1. A platter for use in a forced air / microwave combination oven, the platter comprising an upper surface and a lower surface and incorporating a plurality of apertures passing through the thickness of the platter;

wherein one or both of the surfaces of the platter incorporate a recess substantially surrounding at least one of the apertures.

2. A platter as claimed in Claim 1, wherein the upper surface is profiled such that each aperture is substantially surrounded by an individual recess.

3. A platter as claimed in Claim 2, wherein the recess tapers outwards towards the upper surface.

4. A platter as claimed in Claim 3, wherein adjacent tapering recesses meet at common points on the upper surface of the platter.

5. A platter as claimed in Claim 1, wherein the apertures are arranged in an array of rows and columns, and wherein the upper surface is profiled such that a plurality of apertures in a row are together substantially surrounded by an elongate recess extending along said row.

6. A platter as claimed in Claim 5, wherein the elongate recess tapers outwards towards the upper surface.

7. A platter as claimed in Claim 5 or 6, wherein the lower surface is profiled such that a plurality of apertures in a column are together substantially surrounded by an elongate recess extending along said column.

8. A platter as claimed in Claim 7, wherein the elongate recess tapers outwards towards the lower surface.

9. A platter as claimed in any of Claims 1 to 8, further incorporating an indentation shaped to receive an item of cookware, the indentation being positioned to align the cookware with microwave radiation in the oven in use.

10. A platter as claimed in any of Claims 1 to 9, wherein the apertures are distributed over substantially the entire surface area of the platter.

11. A platter as claimed in any of Claims 1 to 10, made of a polymer material.

12. A platter as claimed in Claim 11, wherein the polymer material is a liquid crystal polymer resin reinforced with glass.

13. A platter as claimed in any of Claim 11, made of DuPont (RTM) Zenite (RTM) 7130.

14. A platter for use in a forced air / microwave combination oven, wherein the platter incorporates an indentation shaped to receive an item of cookware, the indentation being positioned to align the cookware with microwave radiation in the oven in use.

15. A platter for use in a forced air / microwave combination oven, the platter incorporating apertures distributed over substantially the entire surface area of the platter.

16. A platter for use in a forced air / microwave combination oven, the platter being made of a polymer material.

17. A platter as claimed in Claim 16, wherein the polymer material is a liquid crystal polymer resin reinforced with glass.

18. A platter as claimed in Claim 16, made of DuPont (RTM) Zenite (RTM) 7130.

19. A forced air / microwave combination oven having a platter as claimed in any preceding claim.

20. A method of cooking using a forced air / microwave combination oven having a platter as claimed in any of Claims 1 to 18.

21. A method of cooking as claimed in Claim 20 when dependent on Claims 9 or 14, further comprising using an article of cookware shaped to correspond with the shape of the indentation, and locating said article of cookware in the indentation.

22. A platter for use in a forced air / microwave combination oven substantially as herein described with reference to and as illustrated in any combination of the accompanying drawings.

23. A method of cooking using a forced air / microwave combination oven substantially as herein described with reference to and as illustrated in any combination of the accompanying drawings.

ABSTRACT

IMPROVED PLATTER

A platter for use in a forced air / microwave combination oven, the platter comprising an upper surface and a lower surface and incorporating a plurality of apertures passing through the thickness of the platter; wherein one or both of the surfaces of the platter incorporate a recess substantially surrounding at least one of the apertures. The invention also provides a platter incorporating an indentation shaped to receive an item of cookware, the indentation being positioned to align the cookware with microwave radiation in the oven in use. Additionally, the invention provides a platter incorporating apertures distributed over substantially the entire surface area of the platter. Preferably the platter is made of a polymer material, particularly preferably a liquid crystal polymer resin such as DuPont (RTM) Zenite (RTM) 7130. Also provided is a method of cooking using such a platter.

(Figure 2 to accompany abstract.)

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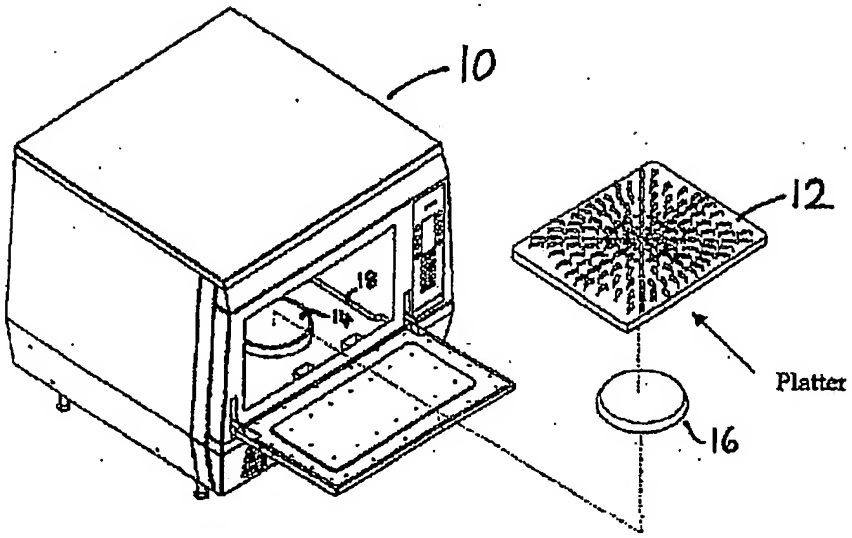

FIGURE 1

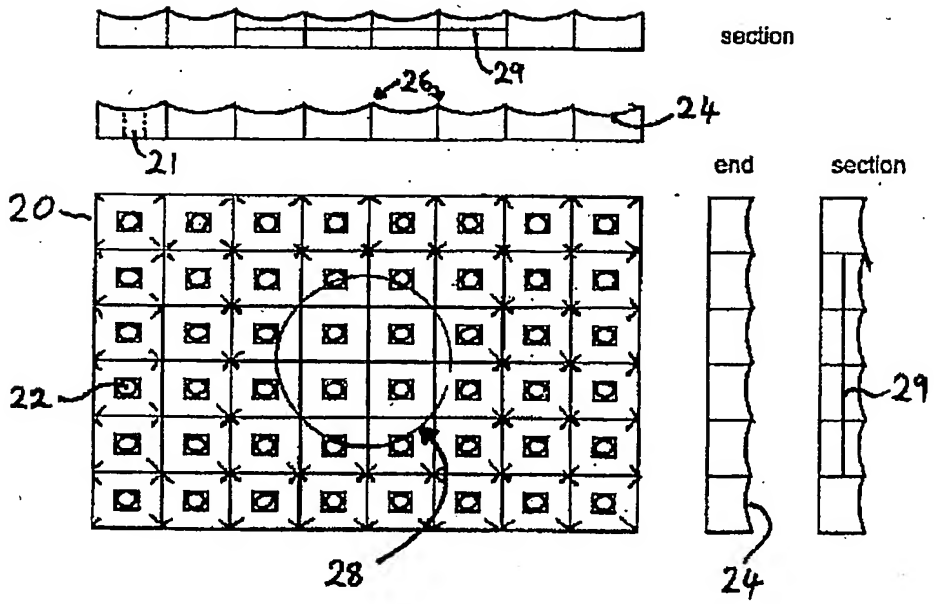

FIGURE 2

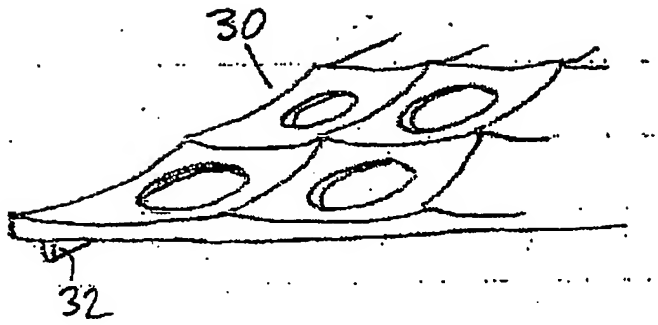

FIGURE 3

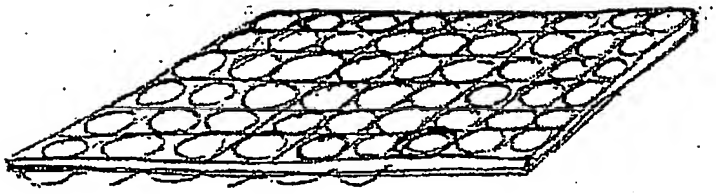

FIGURE 4

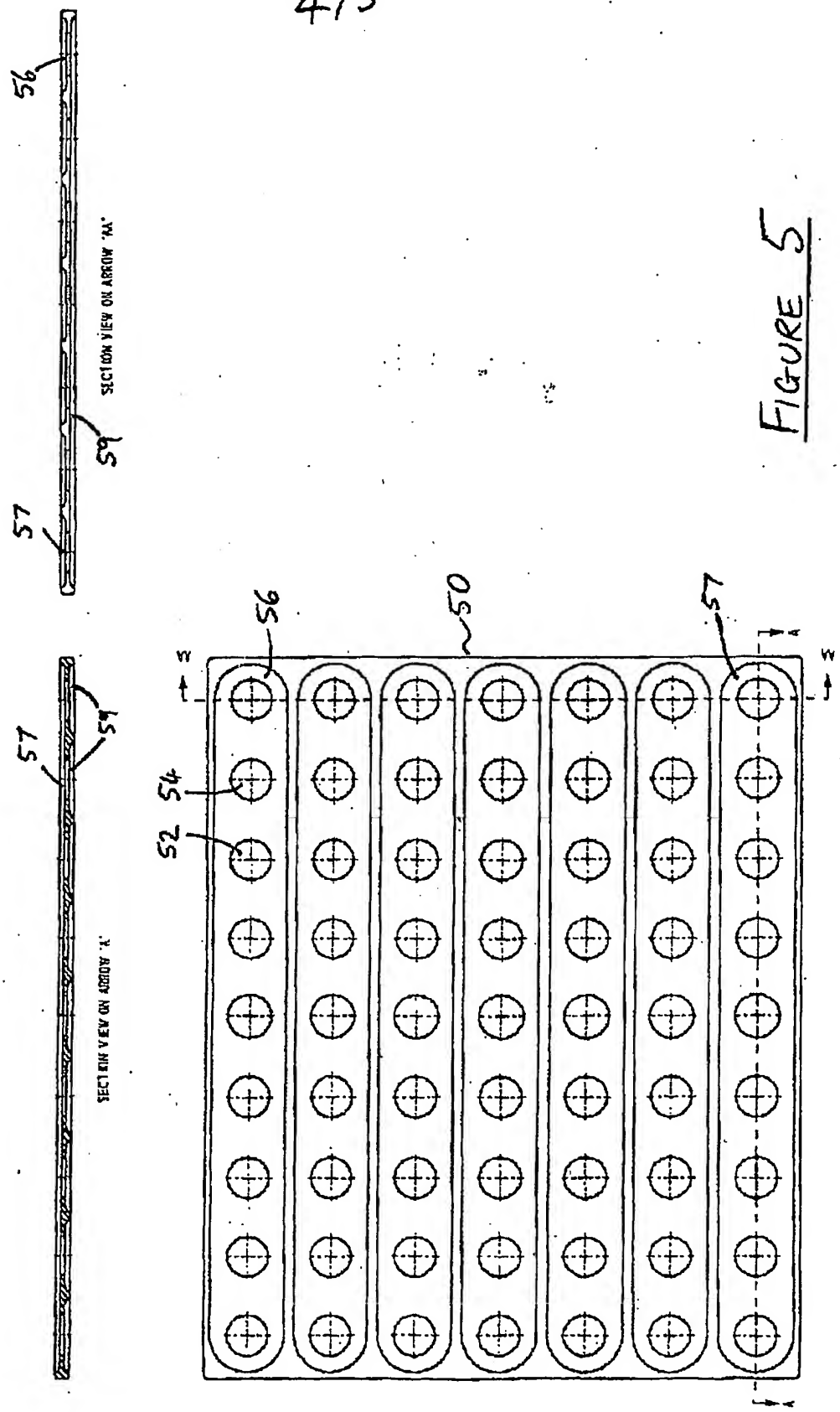
56
SECTION VIEW ON ARROW "A"
59
57
57
59
SECTION VIEW ON ARROW "A"
56
50
57
54
52

FIGURE 5

5/5

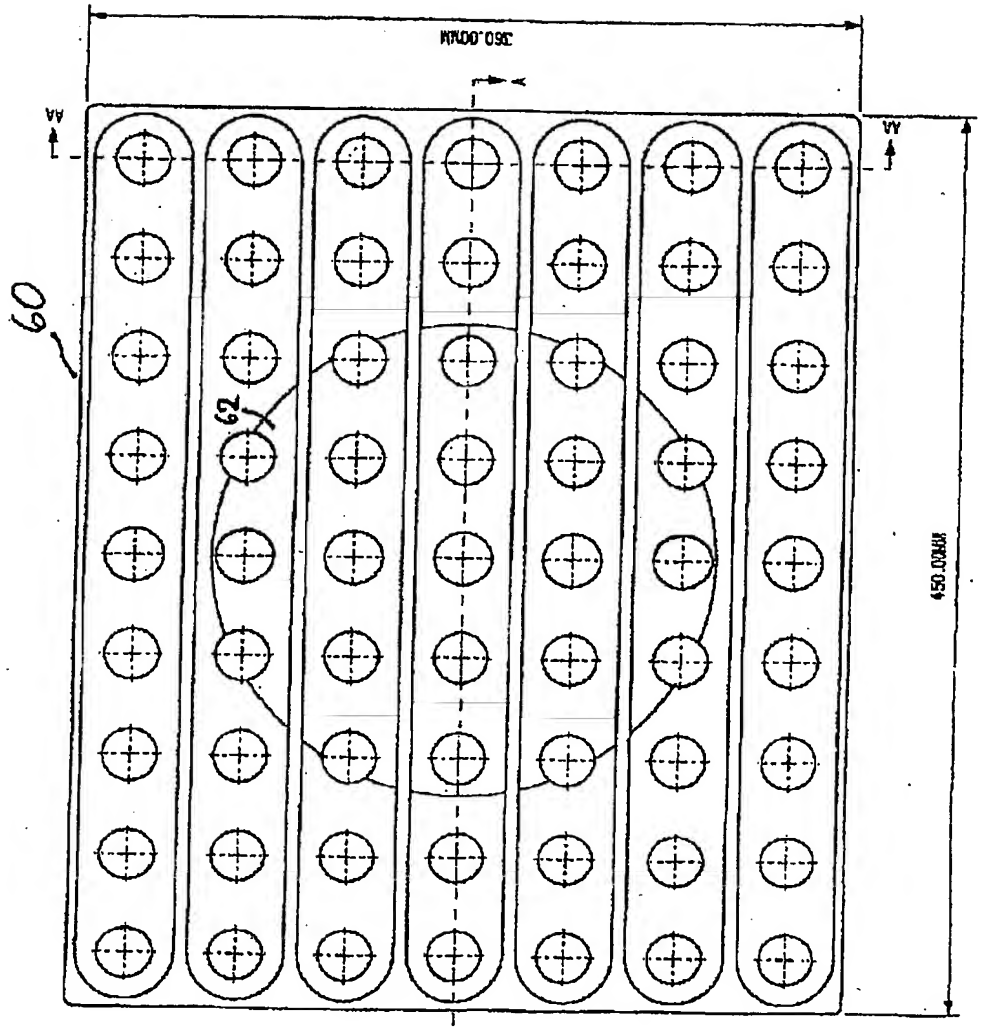

FIGURE 6